

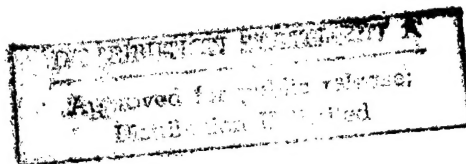
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EAST EUROPE REPORT

SCIENCE AND TECHNOLOGY



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5 November 1985

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## CZECHOSLOVAK METROLOGY SURVEYED

Prague RUDE PRAVO in Czech 21 Aug 85 p 3

[Article by Stanislav Stibor: "Up To One Millionth Precision"]

[Excerpts] The 20th of May, 1875 was the most important date for international unification of units and a subsequent creation of measuring systems continuing til the present time. Representatives of 18 countries signed then the so-called metric convention and the International Bureau of Measures and Weights was established in Sevres near Paris. Czechoslovakia joined the metric convention in 1922 and seven years later bought in France prototypes of a meter and a kilogram which were kept at the then Czechoslovak Central Inspectorate for Calibration Services in Prague.

In 1960 in Paris, the 11th General Conference on Measures and Weights adopted the International System of units, abbreviated as SI (Système International d'Unités); it is based on seven fundamental units - meter, kilogram, second, ampere, kelvin, mol, kandela - and two additional Units - radian and steradian - from which other units are derived. Its use was introduced in the CSSR in 1980. We all still remember well how difficult it was to get used to the term second instead of "vterina" (Czech for second - transl. note) or to pascals in measuring of pression, quite different from the formerly used kilopond to square centimeter or from the even more familiar atmospheres. But it is not only the consistent use of the right units for calculations, in production and in other public practice that matters; the observance of the precision of each of them at the actual measuring process is of equal importance.

That is not always as easy as it would seem at first glance. An independent scientific discipline came therefore into effect already earlier-- metrology-- a science dealing with problems of measuring different physical quantities, a study of methods and means necessary for measuring. It explores methods assuring accurate measurings in research, development, production and other activities. In our country, the principal activity of the Czechoslovak Institute of Metrology in Bratislava, directed by the Bureau of Standards is devoted to these problems.

The Czechoslovak Institute of Metrology, its 17 branches in the whole country (In Bratislava and other 11 cities) develops an extended scientific research

activity; its goal is to develop scientific metrology and to build up Czechoslovak standardization of physical and technical quantities required for the needs of the entire national economy. The results of the Institute's work contribute to increasing quality, primarily by introducing a unified metrological system and by providing the national economy with correct and precise measuring instruments, as well as by assuring their use in various scientific, research and technical applications. The task of the Institute is to verify the standards of national metrology, the main enterprise standards and the selected measuring instruments in production. It assures as well type tests of measuring instruments and a metrological expertise. Further, it directs the creation of the s-called reference materials, verifies their composition and characteristics and develops a relevant cooperation in the framework of the CEMA. It also develops an extensive international cooperation in the field of scientific metrology and participates actively in the solution of metrological tasks, primarily of those resulting from Czechoslovak participation in the organization of socialist countries, the Interetalonpribor. Apart from the socialist countries, its partners are also institutes in France, Great Britain, the FRG, Austria, USA, Canada and other countries. It collaborates with 14 international organizations of metrology and standardization.

With all the extensive tasks of the Institute, its main goal remains the creation and safeguard of standards, i.e., according to one of the definitions, of measuring instruments designated to define, preserve and reproduce certain units of physical or technical quantity. They are arranged in order from primary international to primary and secondary national up to principal and operational in enterprises. For instance, at the Bratislava institute they manufactured, internationally compared and preserved 19 national standards, 10 CEMA standards and around 100 additional primary and secondary standards. For the capacity metrology (verification of standards and measuring instruments of lower order) they have at their disposal 13,000 secondary standards for 22 physical and technical quantities.

The standards of the highest orders are compared internationally. Our national platinum-iridium standards of kilogram weight (bought in Paris) are every 10 to 20 years compared with the only international prototype kept at the International Bureau of Measures and Weights in Sevres. At the Bratislava Institute, they are kept in a safe under two glass bells which prevent penetration of dirt and change of weight. They are used once a year or once every 2 years for accurate weight definition of primary steel (special non-magnetic alloy) standards made at the institute. The primary ones are kept at the research department of the institute and the secondary ones are used at the workshop of capacity metrology for the verification of standards for enterprises and other metrological centers. In this workshop, they verify yearly around 7,000 standards and more than 700,000 different measuring instruments for production.

Weights and scales belong together. At the institute they have three scales bought in Paris still during the pre-Munich republic and today already reconstructed on the premises. After their reconstruction, a verification done in Paris showed that they belong among the five most accurate scales

in the world. At repeated weighing of the kilogram standard (a maximum charge of the scales), the deviation was of approximately one billionth. These scales are not operated though in an ordinary manner. They are kept in a special case, the standards to be weighed are put on them with gloved hands, the temperature, humidity and density of air in the case is carefully measured and a technician follows the values from a considerable distance. One measuring procedure lasts several hours and the result is of absolute precision; with steel kilogram standards, the discrepancy may be 40 micrograms. At the weighing department they have also produced scales for calibration of weights with a range of one to 10 kilograms. When weighing 10 kilograms, the maximum deviation is of 0.15 mg. Following the proposal of the weight metrology department director, ing. Robert Spurny, another standard scales for verification of smaller weights are under preparation and, simultaneously, others are planned with a weighing capacity up to 20 kg used for verification of production weights.

At the Czechoslovak Institute of Metrology, they are not dealing only with problems of weight. The measuring precision demands as well other physical and technical quantities. At the institute, they produced for instance primary and secondary standards for measuring acoustic pressure, a national standard of mechanical oscillation, a standard of angular velocity, a standard of distance covered used for verification of taximeters and kilometer counters and many others. Among them are standards for verification of metrological lasers. An independent field is the measuring of electrical quantities, of magnetism, temperature, pressure, density and others. For the TOS Kurim (machine-tools plant) for instance, they verified a height gage with a differentiation capacity of one micrometer, used, among other, for precise measuring of a gear case body.

Each of the instruments leaving the institute, either produced or verified there, measures the relevant quantities with a precision of thousandths to hundreds of thousandths of units, depending on whether kilograms, centigrades, meters, seconds or units are in question. For measuring time precisely, the institute keeps a caesium atomic standard of frequency which helps to define a second. It enables to measure the frequency and time with a total error smaller than  $10^{-12}$ .

Of an exceptional importance for the national economy are the so-called reference materials, serving to warrant unified and accurate analyses of various chemical materials. They are used for verification and calibration of analytic instruments, for development of analytic methods and they also play a decisive role in arbitration proceedings on evaluation of raw materials and finished products.

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GERMAN DEMOCRATIC REPUBLIC

INFORMATION SCIENTIST SURVEYS GDR COMPUTER TECHNOLOGY

East Berlin NACHRICHTENTECHNIK-ELEKTRONIK in German Vol 35, No 2, 1985 p 42

[Article by Prof Dr W. Cimander, director, Information Technology Department, Dresden Technical University, on the occasion of the 18th Information Technology Colloquium--1985 of the Dresden Technical University's Information Technology Department]

[Text] From 19 to 21 February 1985 the Information Technology Department of the Dresden Technical University conducted its 18th Colloquium under the general thematic title "Communications Technology and Computing Technology."

This colloquium already has a good tradition behind it and annually attracts more than 500 participants from at home and from abroad to Dresden to visit the largest technical educational institution of the GDR with the purpose of exhibiting new scientific-technical results, acquiring new information or exchanging experience. It is already 4 years since the last colloquium having this general theme. There are many new scientific-technical results which have been largely influenced, simulated or brought forth by microelectronics, fiber optics technology and optical electronics.

Thus in microelectronics VLSI technology has become state of the art. This is demonstrated by the production of such circuitry as 256-k dRAM, 64-k sRAM, 32-bit microprocessors, 1-Mbit ROM in those countries throughout the world which are leaders in this area. In addition, there has taken place the transition to CMOS technology which has become of special importance for communications technology in connection with the design and production of customer-specific highly integrated switching circuits.

Microelectronics is one of the most significant key technologies of the present time. It repeatedly gives rise to powerful impulses toward the development of devices and installations for communications technology and computer technology. On this basis there is taking place to an ever more marked degree a steady coming together of communications technology and computer technology, also known throughout the world as "communications and computers" (CMC).

Fiber optics technology also exercises a great influence upon the configuring of communications links and the introduction of new varieties of service having widespread effects. The integration of all services into one digital

network is in process of being carried out or will be gradually accomplished in some countries during the coming decade.

The trend announced already 4 years ago of decentralization of computer facilities has been taking place at a rapid tempo. Workplace computers, office computers and development systems are directly located at the work sites and urgently call for links with one another. For this purpose the local networks offer the appropriate means of communication.

Microcomputers are penetrating in a variety of ways into the configuration of measuring devices and are yielding new instrument systems. Logic analyzers are a typical example.

To an ever greater extent the engineer's workplace is equipped with efficient computers with consequent effects upon the activities of the engineer; circuitry, printed circuits, programs and much more are designed and prepared with computer support. CAD techniques (computer-aided design) will develop in extraordinary breadth and variety.

The above-mentioned focal points: communications and computers, microelectronics and fiber optics technology will be given ample space in the plenary lectures because they are of basic importance for future developments. In the more than 100 specialized lectures these focal points will be geared down and deepened in various ways. But the congress program also includes such important scientific-technological areas as satellite transmission technology, reliability, local communications networks, microprocessor technology, digital signal processing.

A varied and comprehensive program is being offered to the participants in the 18th colloquium. It has been possible to obtain well-known specialists from the areas of education, industry and research both at home and abroad as lecturers and leaders of discussions. The discussion period provided for each lecture, the intermission pauses and the reception for reviewers will provide ample opportunities for the exchange of ideas.

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GERMAN DEMOCRATIC REPUBLIC

# MACHINERY COMBINE LAUNCHES MICROELECTRONICS RESEARCH CENTER

East Berlin NEUES DEUTSCHLAND in German 16 Apr 85 p 3

[Article by Kaethe Aebi: "Microelectronics to Order: In-House Production"]

[Excerpts] In honor of the 40th anniversary of liberation, the first sector of a microelectronics center will start operations at the end of April at the Ernst Thaelmann Combine in Magdeburg. With this start the heavy machinery builders want to fulfill an important obligation of their 85th competition program and, at the same time, honor their revolutionary hero. Researchers and master builders will move into a renovated former utility building. Until the 11th Party Congress a series of microelectronic construction segments and instruments will then be built step by step. At the same time, the preparation of the necessary programs will start on a larger scale.

In the beginning, the SKET Microelectronics Center will employ 70 qualified experts. Next year the number will rise to 100. According to long-range scientific-technical plans of the combine, the capacity of the new plant will double by 1990. Thus the necessary preparations are made in order, in future, to offer complex automated systems under the trademarks of "SKETmatic" and "SKETelektronik."

The Magdeburg combine has developed into a well-known exporter of machines and equipments, and into a competitive producer of work-saving production equipment for GDR industry. Part of its production program is composed of milling equipment, cable and splicing machines, cement plants and special cranes. Why, at the present time, is such special importance assigned to the creation of the combine's own research and production capacities in the field of microelectronics?

## More Than One Third of Products Are New

General Manager Martin Hesse explained the decisive reasons: "At this year's Leipzig Spring Trade Fair we found confirmed those tendencies which our party has repeatedly pointed out. There is a world-wide increase in the use of microelectronics in all fields. Because we have achieved in our country a considerably high level also in this field, the question now is to advance even faster in the utilization of microelectronics in order to raise the level and speed of development of new products and technologies and thereby achieve a marked increase in productivity and effectiveness."

The SKET Combines have therefore formulated their goals of competition in preparation of the 11th Party Congress as follows: with an innovation rate of more than one third, 80 percent of all principal products this year will be equipped with microelectronic control and monitoring systems. The enormous amount of development involved in this plan can be illustrated by looking at what has already been achieved: In 1978 the combine offered its first product equipped with microelectronic components. In 1983 the first piece of equipment with microelectronic computer--a splicing machine--was delivered.

The 1985 goals are--according to General Manager Hesse--decisive guarantees for successful competition with international products which have high utility value and are produced at the lowest possible cost. "Our new basket-splicing machine, which recieved a gold medal at the Leipzig Spring Fair, is our best example. The use of microelectronics results in enormous efficiency values for our customers."

In parallel developments the SKET Collective continues to explore extensive work saving processes for entire production sectors in order to increase effectiveness in its own reproduction process. To sum up, the result will be that this year there will be a 16.3 percent rise in net production through, among other things, a seven percent decrease in milling operations, a 10 percent decrease in energy consumption, and a gain, surpassing all plans, of 65,000 work hours, primarily through extensive use of microelectronics and robotics technology.

Therefore: "The rapidly rising demands on production and utilization of microelectronics are today a challenge to each combine, firm, and collective." This is the philosophy subscribed to without reservation by the Thaelmann workers, as was made clear in our conversation.

#### Preparing Skills For Challenges Of the Future

The information that today sounds so obvious was not at all clear just a short time ago. At that time, the use of switch plates and microchips seemed to go against the honor of many an engineer working in heavy machine construction. It was often said that the old saying that cobblers should stick to their traditional tools still had value today.

The members of the party organization countered with the argument that nothing could be gained on the world market with "old boots." They stated that we must be competetive in order to make our due contribution to the continuation of our good policy for pursuing our main task and securing peace. And today as well as tomorrow, all this relates especially to the key word "microelectronics." Sales experts related their experiences and pointed out that other internationally known heavy machinery producers had developed important microelectronic potentials of their own.

The clarification of these circumstances led directly to the plan of establishing an in-house microelectronics center--utilizing of course traditional construction elements, circuits and equipment--and thereby developing the best possible methods for the innovation process of production.

Parallel to the development of appropriate capacities, a program was decided that will develop and employ the necessary work groups beginning with in-house training programs for electronic experts and leading toward the hiring and long-range training of additional qualified personnel. In the past year alone the firm's own training center, strongly supported by the Chamber of Technology, gave 1,200 Thaelmann workers initial and advanced training in the fields of microelectronics and robot technology. In order to meet the new challenges the SKET's KDT [Chamber of Technology] section in 1984 established a new specialized section for automation technology.

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GERMAN DEMOCRATIC REPUBLIC

# ROBOTRON HARDWARE COMPATIBLE PROGRAMMING LANGUAGES SURVEYED

East Berlin NEUE TECHNIK IM BUERO in German Vol 29 No 4, 1985 pp 116-117

[Article by W. Nyderle, doctor of engineering, Dresden: "Spectrum of the Higher-Level Programming Languages Implemented on the Classes of VEB Robotron Combine Computers"]

## [Excerpts] 1. International Trend

Internationally, it has quite clearly become generally accepted in the last 10 years that the use of higher-level programming languages is an essential and decisive prerequisite for rationalizing software development. Programming languages enable developing portable software and help reduce development time and maintenance costs.

Problem-oriented programming languages will in future completely replace assembler languages in software development: In [1], this is predicted with reference to minicomputers and microcomputers for the following year already. Although the quantitative data contrasted in table 1 [not reproduced] on percent distribution of the use of programming languages in the BRD [Federal Republic of Germany] in 1975 [2] and in the United States in 1983 [3] are not directly comparable, it convincingly indicates the decline in importance of assembler languages. In addition to the pressure to master the so-called software crisis, this trend is being speeded up especially by the incompatibility of microprocessor generations. While the hardware manufacturers up to the mid seventies always saw to it that follow-on models maintained compatibility with their predecessors to the largest extent possible, this principle was not followed for microprocessors. An awakening of the user occurred and compilers were made available in an accelerated fashion. Today, all the common programming languages are available on microcomputers. A list of 42 different personal computers from 32 manufacturers [4] indicates the availability of compilers and interpreters as shown in table 2 [not reproduced].

Compilers of higher-level programming languages have proven to be the most successful software tools [5]. They must, however, be expanded in future more strongly by tools which support program design, interface testing and program testing.

## 2. Higher-Level Programming Languages for Robotron Hardware

Table 3 [not reproduced] gives an overview of implementations of problem-oriented programming languages available for the various classes of VEB Robotron Combine computers and operating systems. The main languages such as FORTRAN, COBOL and PASCAL which are available for different Robotron hardware are in contrast to such languages as PL/1, RPG II, etc. which are offered only for ESER [Unified System] hardware. This distinction will continue, i.e. the main languages will also be provided for future classes of VEB Robotron Combine computers.

Table 3 [not reproduced] also shows the PSU (programming supporting environment) [6] and the programming language MODULA 2 equated to operating systems, although they are not Robotron products. Both may assume growing importance for software development in the GDR in the coming years. The PSU is compatible with the MUTOS operating system for the Robotron K 1600 computer, the Robotron A 5120.16 office computer and the A 7100 workstation computer. MODULA-2 is a system programming language which as such will surely replace PASCAL. It is based on PASCAL, is free of some of the constraints and defects of PASCAL which cause trouble for system programming, and has an efficient modular concept.

In what follows, some details are given only for the programming languages which are relevant for several computer classes and for PL/1 (because of its widespread use in the GDR).

### FORTRAN

FORTRAN IV is the oldest problem-oriented programming language and is dominant now as before in the scientific and technical area. The early standardization (1966) has led to the standardized language volume of this relatively simple language being implemented identically on almost all types of computers. Because software portability is thereby strongly supported, FORTRAN is particularly suited as an implementation language when the software (for example OEM [original equipment manufacturer] use) is to run on any customer hardware. The further development of FORTRAN 77, standardized in 1978, is distinguished primarily by language elements for structured programming, character string processing and improved file handling. The VEB Robotron Project in Dresden will offer FORTRAN-77 implementations in future.

Among the FORTRAN IV compilers for the OS-ES [Unified System Operating System], note that since the issue of OS-7, only the FORTRAN programming system and the FORTRAN OE compiler are still being marketed.

### COBOL

COBOL is by far the internationally most used programming language [2], [3]. According to [7], it is a more natural and suitable language than PL/1 for typical data processing applications (commercial problems, large-scale data processing).

COBOL was originally designed for large computers and has now been implemented for microcomputers [8], even though interactive processing has still not been satisfactorily standardized. The ANSI [American National Standards Institute] standard of 1974 (ISO [International Standards Organization] 1978) is currently being revised. COBOL is also the only language with standardized problem-oriented language elements for teleprocessing.

The obsolete COBOL compiler (1968 standard) in addition to the COBOL programming system for OS-ES will no longer be delivered in future.

#### PASCAL

PASCAL was originally designed as a teaching and learning language with special emphasis on structured programming. The easy portability of the PASCAL compiler led to rapid spread of the language. But it has not met all the needs of users; thus, a number of expanded language versions have been developed which are no longer compatible with each other (UCSD [University of California at San Diego] PASCAL is the most well known). The late standardization of PASCAL by the ISO led, among other things, to the ANSI and ISO standards not being completely identical.

The PASCAL implementations of the VEB Robotron Combine, except the commercial implementation for SIOS and BROS, are related to the ISO standard and are compatible with each other because they all came from the implementation of Berlin Humboldt University.

It should be noted that there are also some other incompatible PASCAL implementations in the GDR, for example [9].

#### BASIC

BASIC was created as an easily learned beginning language; its particular advantages are support of program development and testing in the interactive mode. BASIC interpreters and sometimes compilers are available for almost all home, personal and office computers. The lack of many customary language elements and the initial need for language implementations on inefficient microcomputers led to many different language versions and special BASIC languages being implemented.

For example, business BASIC (SIOS and BROS) is one of the special languages which is incompatible with the other BASIC implementations. BASIC 1600 and BASIC 1520 (SCP, UDOS) are indeed both related to the minimal BASIC standard of 1978, but they are nevertheless not fully compatible.

Attempts are currently being made to stem the flood of different versions by a new BASIC standardization.

## C

The C programming language is suited particularly to systems programming. It has been spread with the UNIX operating system for which it is the "mother tongue." C is often called a higher-level assembler language because it combines the properties of an assembler language with the structured and computer-independent language facilities of problem-oriented programming languages. Since C, in contrast to some other problem-oriented programming languages, imposes no serious restrictions and constraints on the programmer, C has been rapidly accepted by determined assembler programmers.

The C implementations on Robotron hardware are compatible.

## CDL

CDL is also a systems programming language which guarantees high efficiency of programs and supports software portability to a unique extent. Using the capability of universal object code generation, a CDL compiler can also be used on a computer as a cross-compiler for all other classes of computers. In addition to the compilers shown in table 3 [not reproduced], there are cross-compilers for the K 1520 and the new MMS 16 16-bit microcomputer. All CDL implementations are identical since they were generated by porting by using CDL.

## PL/1

The development of PL/1 was advanced chiefly by IBM and was to cover the typical applications of COBOL and FORTRAN. It is a very extensive, difficult to learn, and error-prone (because of many implicit assumptions) universal language which is clearly inferior to its predecessors in program efficiency. Also, on small and micro computers, PL/1 can be efficiently implemented only on higher-end models. For these reasons, PL/1 has not found international acceptance.

Moreover, PL/1 compilers are available from the VEB Robotron Project in Dresden only for ESER [Unified System] hardware. It should be noted that this implementation does not fully conform to the ANSI standard.

### 3. Goals of Compiler Development at the VEB Robotron Project in Dresden

The number of VEB Robotron Combine computer classes and operating systems to be covered by programming languages will be further increased in the coming years. This will result in new requirements for compiler development.

The VEB Robotron Project in Dresden which has the lead responsibility for programming languages within the VEB Robotron Combine has set the following goals for the future:

- satisfy user demand for continuity in the offering of higher-level programming languages,
- give priority to making available programming languages internationally introduced and distributed,

--ensure portability of applications software by compatible implementations oriented to international standards.

To achieve these goals, portable compilers are being implemented gradually. The concept of portable compilers as advanced in [1] and explained in [10] has already been proven successfully on an experimental basis with COBOL 1520/1620. It will become assimilated into practice with the help of systems programming languages and other technological means for compiler development now being developed.

NTB 3355

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CSO: 2302/98

GERMAN DEMOCRATIC REPUBLIC

CALL TO EXPAND INFORMATION NETWORK FOR BASIC RESEARCH

East Berlin DAS HOCHSCHULWESEN in German Vol 33 No 6, Jun 85 pp 168-171

[Article by Joachim Kramer: "Information Services and Efficiency of Scientific-Technical Research"]

[Text] More and more, the production increases achieved in our national economy are the result of scientific-technical progress, especially with the introduction of modern technologies into the production process.

This was stated by Erich Honecker in his report to the 9th meeting of the SED Central Committee in 1984, and this statement came in connection with an expression of appreciation, given at another occasion, for the achievements of our universities and institutions of higher education.

From this commendation, however, follows a strong challenge to make additional contributions to the acceleration of scientific-technical progress.

Our universities and institutions of higher education have a considerable research potential at their disposal.

This potential is given two essential challenges:

1. to achieve results that, in the sense of fundamental solutions, contribute to the sciences' own development, determine development directions, insure instruction on a high level, lay long-range foundations for technically applicable results and,
2. on this basis, make achievements that are apt, within shorter time spans, to result in effects on the national economy in as much as they are, as soon as possible, made part of the national restructuring process as new technologies or products.

There is a special need for achievements that are sufficiently superior to the international state of technology and are suitable for having, under the concrete conditions of our national economy, important long-range effects, i.e., especially on production and export.

Top achievements of this kind are especially needed in fields as important for our national economy as:

- consolidation and expansion of energy supply
- consolidation of raw material supplies by increased utilization of domestic resources
- improvement of the consumer goods economy, of the quality of products and the technical-economic level of production
- microelectronics
- robot technology
- introduction of new technologies and processes into all fields of production (among them construction and agriculture)
- consolidation of food supply
- support for, maintenance and restoration of health.

The system of higher education is annually involved in about 3,000 research projects, among them, e.g., in 1984, 200 projects related to the national plans on science and technology.

Results, e.g., in the fields of monoclonal antibodies or of assembly technology of microelectronic construction elements show that excellent contributions were made to scientific-technical progress, and for achievements like these, among others, appreciation was expressed at the 9th meeting of the SED Central Committee.

The growing effectiveness of the increased quality of higher education research is also indicated by the increase in patent grants to 16.9 inventions per 100 higher education research groups in 1983. In 1984, educators obtained about 1,800 patents, that is about 15 percent of the inventions for which patent rights were applied in the GDR. Considering that only about 6 percent of our research potential is concentrated in higher education, these achievements are proof of above-average progress.

These and other good results, especially in 1984, encourage us to deal with the more important challenges before us. Their focal point is the formulation of research concepts up to the year 2000 on the basis of an appropriate decision by our party and government on the main direction of development of science and technology up until the end of the century.

To put this decision into effect and also meet the specific challenges of higher education, it is necessary to determine long-range basic research requirements between now and the year 2000, and to submit the appropriate documents for approval.

Development directions and focal points of research must be determined together with the essential research results to be achieved in the time period before us, on the basis of which the production level can be noticeably raised. Needed for this purpose are completely new technologies that form the basis for innovative products as well as achievements that lead to an increase in effectiveness of existing procedures and to the consolidation and improvement of production quality. The responsibility of the higher education system and its work in conjunction with the GDR Academy of Sciences relates especially to long-range scientific projection beginning with joint responsibility for basic research.

As is the case with results in applied research, especially high demands are also made of basic research results (which as a rule form the basis of applied research). The following are in demand:

- originality, innovation, advantage over the world-wide level of science and technology
- high productivity and far-reaching effectiveness for future products of the national economy and also as a basis for challenges to applied research
- a balanced cooperation with research partners of the socialist community of nations in order to avoid duplication and achieve joint utilization of results.

Besides these challenges to quality and originality, the timing of completed results is of decisive importance in regard to their quick absorption into the national economy, to the consolidation of our position and to their undisturbed utilization and security, e.g., through patent applications.

Considering these challenges and including others that result from up-to-date instruction, it becomes clear that these challenges cannot be met without exact knowledge of the advanced standing of international science and technology, without consistent world-wide comparison, without well developed information services as a part of research work.

There are also other phenomena that motivate us to pay greater attention to information services. Among these is the low quality of individual research and patent applications as well as the relatively low level of expenses allotted to the determination of world-wide data. The statement<sup>1</sup> that the funds allotted for literature and patent research in the GDR are much lower than those, e.g., in the United States, Great Britain and FRG applies also to higher education research in natural sciences and technology.

The work on world-wide comparisons, the description of advanced international standards during the defense and evaluation of completed projects at the point of their acceptance by the employer make it clear that the realization that the quality of research work is directly determined by the quality of information service has not resulted in practical action at our universities and institutions of higher education to a sufficient degree.

In order to change this situation steps must be taken in three directions:



from which are to be derived consequences with regard to necessary protective measures and on whose basis proof is to be submitted of the required absence of defective titles. These requirements make also clear that there is no point in time before the completion of a research project at which information services can be considered complete, but rather most information services always continue parallel to research work in order to provide continual incentives from international standing and trends, and to put into effect constantly the basis for work on patent rights and licensing. With regard to transfer of results to production, sales and license grants, it is even necessary to continue information service after the completion of research projects.<sup>2</sup>

The responsibility for information service capabilities in research can rest only with those responsible for the research. They are primarily those people entrusted with responsibility in research work. Their duties and authority are defined, as far as they are applicable to the higher education system, in the "directive no 30/1983 of 28 November 1983 concerning those entrusted with responsibility for research at universities and institutions of higher education" (Directives and Announcements of the Ministry for Institutions of Higher Education and Specialized Training Institutions No 1/1984 p 3). Among the essential duties with regard to information service of those entrusted with responsibility and of research groups are the following:

- determination and definition of information needs and of the information services to be performed, as well as of the necessary personnel, financial and material-technical needs;
- deposition of information service jobs in documents and contracts including agreements in regard to the necessary cooperation with employers/users of the research project;
- performance of information services during research process, including utilization of available information sources (appropriate information stores, bibliographies, literature anthologies, literature studies and others) in cooperation with information service officers and library branches/information equipments. When research projects are related to areas involving patent rights, patent literature must first be analyzed;
- correctly prepared and defined information on research results so that they can be passed on to information systems in accordance with legal regulations and contractual agreements;
- availability, for the purpose of future utilization, of the results of information service work obtained during the research process.

It is self-evident that these problems can be solved only if realistic appropriations are made for the necessary needs in personnel, time, finances and others according to actual requirements. Appropriations amounting to 20 percent of the total research cost are considered entirely realistic.

Raising the value of information service in research work also means paying greater attention to it in research management. As is the case with patent

1. raise the value of information service as an effective research factor
2. expand efforts to communicate with scientists and future scientists, in a reasonable distribution of work, on the knowledge available of means, methods and consistent performance of information service
3. consolidate and expand the personnel and material-technical basis of information service.

The value of information service results from the challenge made to the level of the goals and results of scientific-technical research. Without the knowledge of the advanced international standing of science and technology, as it can be obtained from appropriate literature--of special importance here are patent descriptions, industrial brochures, travel and meeting reports and magazines--it is neither possible to formulate challenging research goals nor to evaluate results objectively. The challenge to the higher education system to determine long-range basic research goals leading to completely new directions and fields can be realized only on the basis of a broadly constructed information service with accent on the main directions of basic research. Because it is the researcher who receives incentives for his creative work from the information service and because information can be understood and correctly evaluated only with solid field knowledge, there can be no separation between research and information service. (The possibilities of specific work assignments will be discussed later.)

A number of legal directives obligate scientists to employ reliable information services. Among these directives is the "Directive of 28 May 1975 on the nomenclature of work levels and performances in tasks related to the science and technology plan" (GBI I No 23 p 426).

Concrete information services are required for, among other things, prognoses and studies as well as for the G and A levels that are most frequently dealt with by the higher education system. For G 1 the requirements are:

--"the evaluation of prognoses, literature, analyses and document research studies on the development of social needs and requirements; and the scientific-theoretical level of knowledge and the scientific development

--the analysis of the patent situation,"

and analogous results are to be submitted for level A 1. Results of the information service are to be reported in the opening defense of the project, and these results are the basis of the project concept in subsequent work phases. According to the "first performance directive of 23 November 1983 on the requirement of obligatory documentation for research and development work--obligatory documentation directive" (GBI I No 36 p 381), the final defense of the project must contain a written evaluation of the "national importance of the obtained qualitative level of product or procedures in relation to worldwide standards." In addition the nomenclature of work levels, e.g., G 4 and A 4, requires:

--"evaluation of the result in regard to its level compared with worldwide standards,"

work, international research cooperation documentation and contract work, among other things, information services must also be managed a factor determining the level and effectiveness of research.

The managerial aspects of research work should focus on research groups, on the organization of a consistent information service performance, on effective work assignments among researches, information sources, libraries, employers/cooperation partners during research as well as on sharing knowledge of information service work and on the organized actions of information service groups.

The purpose of all this is to regulate through special legal directives the responsibilities for information services as a component of scientific-technical research for the higher education system.

Of greatest importance is the more effective access to knowledge about information service, about the value and accessibility of different sources, about the consistent management of information processes and the utilization of automated systems by scientists and especially by future scientists.

Greater attention must be paid to accessibility of knowledge of this kind beyond the service functions of the libraries in the interest of the quality of research. There is a need to provide basic knowledge of information services for all those actively involved in instruction and research. In addition to this, it is necessary that sections or fields of sciences have work groups that have deeper knowledge of information science, that are, as expert information groups, advisers and focal points of information service in their specific fields of work, and that can solve special problems in these fields. Among these problems is the completion of thematic research work, of trend projections and analytic-synthetic items of information, the consistent completion of work in connection with the formulation of requirements and orders for EDP [data processing] based research work as well as the documentation of research results according to EDP standards on the basis of the "Directive of 20 July 1979 on the Preparation of Information about Scientific-Technical Results" (GBI I no 19 p 164). In the utilization of these information expert groups and in the reasonable work assignments for both researchers and information groups (who in principle are also researches) lie essential reserves of information service.

By appropriating funds for information services, for the use of information expert work groups, for strengthening the information/documentation sections of higher education libraries, for the formation of information centers for the main research fields, among others, the higher education system has already taken essential steps to expand the personnel and material-technical basis of information service. Of great importance was the establishment of the polytechnical patent libraries at the Institutes of Technology Dresden, Ilmenau, Karl-Marx-Stadt and the Otto von Guericke Technical Institute Magdeburg. In this connection, special mention should be made of the achievements of the Ilmenau Institute for the completion of an automated patent preliminary research system.<sup>3</sup> This system makes research work easier for the scientists and improves access to patent literature as perhaps the most important information source for many fields of scientific-technical research.

On the national level the material basis of information service was further improved by the establishment of special information services for the development and utilization of microelectronics, robotics technology, energy conservation, consumer goods economy and others, and thereby the information system for science and technology was supplemented. The establishment of the world patent service through the AfEP [Patent Office] was a step in this direction. It will now be of special importance for institutions of higher education and research groups to become better informed about the available sources and to learn step by step how to use, especially, modern systems such as the tape recording services of the VINITI [All Union Institute of Scientific and Technical Information] of the USSR (through ZIID [expansion unknown]). The gradual establishment of information networks and data banks in the GDR and, in conjunction with this, the use of modern processing systems opens up new possibilities of consistent information service and, at the same time, gives new challenges to the users. Through close cooperation with research groups, increase of in-house information services, consistent, balanced work assignments in information and documentation work among researchers the effectiveness of the information/documentation sections of higher education libraries must be further raised to the level and effectiveness of research, and these sections must be control point as well as an achievement factor in the information service related to research.

In the future even greater attention will have to be paid to securing the technical basis of information service especially in regard to modern computer and duplicating technology.

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#### FOOTNOTES

1. cf Hausteil H D, Nachbar M, "Aur Leitung komplexer Neuerungprozesse" [On the Management of Complex Innovations Processes] in: "DER NEUERER" [The Innovator] vol 5/1978B
2. cf Kramer J "Zur Gestaltung der Lizenzarbeit als Bestandteil der naturwissenschaftlich-technischen Forschung" [License Preparation as a Part of Scientific-Technical Research] in: DAS HOCHSCHULWESEN [Higher Education System] vol 9/1984 p 243
3. cf Weber F, "Der Beitrag der Patentinformation fuer eine wissenschaftlich-technische Arbeit mit hohem Nutzeffekt [The Contribution of Patent Information to Scientific-Technical Work with High Utility Value] in: "DER NEUERER" vol 12/1984 B p 164

8889

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GERMAN DEMOCRATIC REPUBLIC

# GDR SCIENTISTS DEVELOP ELECTROLUMINESCENCE DISPLAY

Magdeburg VOLKSSTIMME in German 20 Jun 85 p 4

[Article by Christian Waldner: "Worldwide Search for Flat Display Screens"]

[Text] Scientists of the GDR Academy of Sciences have succeeded in producing electroluminescence displays. The meaning of this term, so difficult for the layman to pronounce, has been explained by Prof-Dr Gerd Otto Mueller of the Institute for Electron Physics. He is a member of a research collective which also includes scientists of the GDR Optoelectronic Center (the Berlin Plant for Television Electronics) together with scientists of the Humboldt University in Berlin.

A "display" is a panel on which information is communicated. How this takes place is indicated by the term "electroluminescence." It denotes the production of light in solid bodies through the application of electrical fields. The first to hit upon this idea was the Japanese Dr Inoguchi. When in 1974 he presented his research results to the international scientific world the experts shook their heads. For during the fifties similar experiments had already come to grief. But since then in the bright future of electroluminescence displays there is no longer any cloud of doubt that they are now already in their first phase of application. There is feverish competition in many research organizations aimed at developing the technology of this new electrically controllable light source as fast as possible and producing it economically.

At the Institute for Electron Physics a partial success has been achieved. Jointly with partners in the Television Electronics Plant and in the Berlin Humboldt University they have developed a laboratory technology. This has made possible the manufacture of models of such a display. Thus today future users can familiarize themselves with the new technique.

In the displays we are not dealing with a filament which converts current into light as in the case of the incandescent bulb, but rather the conversion is accomplished by a very thin layer (very thin in this case means 50 times thinner than a human hair) consisting of a semiconducting compound which is based upon a glass support only a few millimeters in thickness. This thin film, embedded in equally thin layers of insulation, is covered with a superfine lattice of electrode strips. The experts speak in terms of rows and columns. At

the points where these strips cross one another light is produced in the semiconductor as soon as the voltage exceeds a certain limiting value. The color of the light depends essentially upon the constituents of the semiconducting compound. At the Institute for Electron Physics the points, which combine on the panel into numbers and letters, are a dazzling yellow. This effect is produced by manganese atoms which have been introduced into a zinc sulfide layer.

The problem which at the present time has the scientists stumped is the voltage which initiates the electroluminescence process--that is, the control voltage. The voltage values are large and this is a disagreeable circumstance because up to now design in the electronics industry has always featured low voltages. In order to attain the desired output--the luminescence--the experts could take another route involving the use of low voltage. But for this they would have to increase the current strength since power is equal to voltage times current. But according to Prof Mueller thus far no sufficiently transparent materials have been known which are capable of carrying such high currents. Thus the experts have no other course available at the present time than to get along with the high voltages. Therefore a search is under way for new technological approaches to the design of control circuits in electroluminescence displays.

These ELD's have distinct advantages compared with the familiar liquid crystal displays used in wristwatches and pocket computers. High contrast, for example, and greater brightness. In addition, there is the advantage of low weight, small structural depth (30 mm, for which reason they are also called flat displays) and long working life. The scientists speak of 100,000 hours as opposed to 5,000 to 10,000 for a traditional television tube.

There are good reasons, according to Prof Mueller, to predict a great future worldwide for the ELD. Such display panels will be found in airports and railway terminals, in the covers of portable computers and by the end of the century possibly will replace the picture tube of the television set which will then simply hang like a picture on the wall. This presupposes that by that time the scientists have found new materials yielding new colors, learned how to mix the colors and, working with their colleagues in industry, succeed in finding a technology to produce such television receivers economically.

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GERMAN DEMOCRATIC REPUBLIC

ADVANTAGES OF FULLY AUTOMATED NIGHT-SHIFT PRODUCTION VIEWED

Leipzig LEIPZIGER VOLKSZEITUNG in German 22-23 Jun 85 p 11

[Article by Prof Dr Werner Kriesel, Leipzig Technical University, deputy chairman of the Chamber of Technology Bezirk Committee: "The Old, New Dream of the Unmanned Factory--Not Everything Which Is Technically Feasible Also Makes Economic Sense"]

[Text] Robots bring up the tools and the materials, automata process the steel, sensors control, before finally the finished product is automatically packaged and shipped. Is this vision realistic? To answer such a question it has become conventional today to turn one's attention to Japan.

Japan's largest manufacturer of machine tools has built an experimental shop as a test subject modeling a fully automated and flexible factory. The objects manufactured are large parts for numerically controlled machine tools, with castings being drilled and milled. At the end of the second daytime shift the lights in the windowless shop are extinguished and the 18 processing centers carry out their drilling and milling entirely without human workers (see sketch) [Sketch not reproduced], guided and supervised only by microelectronic automation. Thus the "ghost shift"--at least in the experimental stage--has already become reality.

This laboratory is intended to be only the curtain raiser to a long-cherished plan to install similar factories not only in Japan but also in the future on other continents. The primary goal is to shorten the technological throughput for a new numerically controlled machine from around 4 months to less than 1 month. In addition, 18 processing centers replace about 70 numerically controlled machine tools. And in place of an equal number of operators working on a three-shift system only 12 workers are employed during the 2 daytime shifts, while at night there is no one in the shop at all.

From this fact there follows in particular that, for example, when a tool breaks there must follow a fully automated replacement of the tool and after automatic adjustment production shall be rapidly resumed without manual intervention at the site of interruption. This must be accomplished without any offsets being discernible on the processed parts. This presupposes, in addition to highly developed sensor technology, that the parts produced shall have been computer-designed (CAD) with a high degree of uniformity so that, for

example, fewer than 20 percent of the number of tools used previously would now be required.

Computer-supported manufacturing (CAM) is managed by a central computer together with five subcomputers handling geometric and technological data and also controlling the processing sequence. Such unmanned production naturally presupposes perfect organization, including on-schedule and high-quality supplies. A further requirement for the achievement of such goals is a very flexible system of manufacturing with microcomputer control which can respond rapidly to specific changes in the product line being manufactured. Thus in the experimental system which has been mentioned processing plans for 1,400 workpieces in 74 configurations have been stored in memory.

Flexible and fully automated manufacturing facilities of this sort are very expensive and therefore should come as close as possible to round-the-clock production. In the present state of this technology it is already possible to construct complex systems which carry out drilling and milling for 24 hours in the day and for 7 days in the week with 1 weekend a month being reserved for preventive maintenance.

It appears that because of its disproportionate cost a totally unmanned factory is unlikely--but a totally unmanned production shop during the night shift within a minimally manned factory is entirely conceivable. Engineering approaches of the latter sort are reasonable targets for the future; they are realistic and in no way speculative. In fact they would assure an almost 100-percent utilization of our cost-intensive manufacturing equipment (basic plant investment). At the same time we not only conserve labor force and intensify simultaneously our production processes but also with such futurist methods we further develop over the long term our sociopolitical program.

All this is certainly still a long way off and the application of these ideas on a broad scale requires many years of hard work. Nevertheless, the direction and the goals of this line of development are already clearly discernible today and are also being pursued in our republic through a program of minimal work force manufacturing. Microelectronics and robot technology are important milestones on this route. Therefore we must also orient our training and continued education efforts in this direction in advanced schools and in the domain of the Chamber of Technology.

8008

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GERMAN DEMOCRATIC REPUBLIC

## SCIENTISTS CITE USES OF CRYOGENICS, LOW TEMPERATURE MEASUREMENT

East Berlin NEUES DEUTSCHLAND in German 27-28 Jul 85 p 8

[Article by Prof Dr Rudolf Knoener, head of the Department of Low Temperature Physics, Dresden Technical University, and Dr Reinhold Weiss, assistant professor (same department)]

[Excerpts] In Principle, Efficiency Declines

By low temperatures, the physicist means phenomena and processes occurring at temperatures below 120 K ( = -153 degrees Celsius). Accordingly, cryogenics (Greek: kryos = cold) has to do with the production as well as the technical and technological application of temperatures below 120 K, in contrast to refrigeration technology, which is responsible for the temperature level above that.

Essential for the understanding of the production of very low temperatures is the fact that in principle the efficiency of refrigeration machines declines as temperatures fall and that a temperature of absolute zero can never be reached. This means that the usual way of thinking in temperature differences, whose point of reference is the ambient temperature, cannot be applied. In other words, it means that lowering the temperature to -100 degrees Celsius is substantially more expensive than increasing the temperature to +100 degrees Celsius.

In attempting ever-lower temperatures--the record low temperature is 0.00000003 K--completely novel natural phenomena could be observed. The physical properties of a great many materials change drastically when temperatures are lowered significantly.

The change in the mechanical properties of metals with temperature has, to be sure, the consequence that primarily high-alloy steels have to be used in low-temperature facilities to preclude the brittle breaking of structural parts.

Low temperatures are also important in electrical engineering, where they can increase the electrical conductivity of the metals copper and aluminum, the conductors most used, by a factor of 10 with the lowering of the temperature to 80 K (-193 degrees Celsius).

Probably the best known low-temperature phenomenon is that of superconductivity. A large number of metals, alloys, semiconductors and even organic compounds no longer have any electrical resistance whatsoever at temperatures below the so-called cracking temperature. In addition, their magnetic properties change when the transition temperature is reached.

All of the superconductors discovered so far have cracking temperatures under 25 K (-248 degrees Celsius). Despite an intensive search and a purposeful development of materials, however, no one has yet been successful in substantially raising the cracking temperature or even in finding superconductors in the range of normal ambient temperatures. Nevertheless, the technical and metrological application of superconductivity is undergoing a great boom. The almost loss-free transmission of electric energy but on an even more significant scale the possibilities for the production of very powerful and complicated magnetic fields and their application in electric generators up to the gigawatt range are the developments now being promoted most heavily.

#### Extremely Cooled and Precisely Measured

An additional extensive area for the application of superconductive material is in the measurement of very weak magnetic fields or very slight electrical currents and voltages. It is thus possible to overcome the limitations of traditional metrology in many areas and open up important new areas such as, for example, the measurement of biological currents in medicine.

Cooled radiation sensors--both on the basis of superconductivity and other means of operation--also play a significant role in the remote reconnaissance of the earth. By cooling them down to low temperatures, the thermal background noise of receivers can be greatly reduced, thereby substantially raising their sensitivity.

Liquid helium is indispensable for cooling in the temperature range below 15 K (-258 degrees Celsius). At the same time, however, helium itself represents a very interesting physical subject for research. Helium becomes superfluid at a temperature of about 2.2 K. That means that helium can flow through even the narrowest channels and pores without frictional resistance. Compared with normal liquids, then, it shows a completely different flow behavior. The reason for it is in the analogy to superconductivity in the quantum effects of the movement of helium atoms.

#### Inherent Laws Easier to Grasp

An important technical consequence of this effect involves the outstanding cooling action that can be achieved with superfluid helium.

The research on the production and properties of materials at low temperatures has made a substantial contribution to our present-day understanding of inherent physical laws. At the same time, it was possible to make available a

large number of technical applications and processes that have been highly beneficial to the national economy and that have led to completely novel solutions, a development that is by no means finished.

9746

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GERMAN DEMOCRATIC REPUBLIC

DIRECTOR OF INDUSTRIAL FACILITY CONSTRUCTION COMBINE INTERVIEWED

East Berlin BERLINER ZEITUNG in German 23 Jul 85 p 3

[Interview with Dr Klaus-Guenter Sorg, Director General, Central Industrial Facility Construction for Metallurgy, by Karl-Heinz Bergmann: "ZIM: Pace-Setter for Streamlining Measures"]

[Text] Dr. Klaus-Guenter Sorg, 49, has been heading the combine since its formation. Prior to this, he was for nine years plant director of the VEB Central Engineering Construction Plant for Metallurgy. The trained design carpenter holds a graduate engineer-economist's degree from the Mining Academy of Freiberg and a doctoral degree from the same institution.

The combine Central Industrial Facility Construction for Metallurgy [ZIM] is one of the newest in the capital. Recently, on July 1st, it observed its first anniversary. We talked with its Director General, Dr. Klaus-Guenter Sorg, about the purpose of the combine and its proposed projects with regard to the competition focusing on the upcoming XIth Party Congress of the SED.

BZ: Until a year ago, the acronym ZIM stood for "Zentraler Ingenieurbetrieb der Metallurgie" [Central Engineering Plant for Metallurgy]. Now it represents "Kombinat Zentraler Industrieanlagenbau der Metallurgie" [Central Industrial Facility Construction for Metallurgy]. Why the change?

Dr. Sorg: The formation of the combine has brought research, project formulation and production more closely in line with each other. The capacity of the former VEB ZIM was expanded to include tool construction, sheet metal processing, machine and crane assembly, measurement, control and regulation technology and also microelectronics. This makes it possible for us to approach the called-for methods of rationalization and automatization in the metallurgical industry in a concentrated way. Our task is to bring about far-reaching changes in the field of metallurgy in the GDR, by the application of state-of-the-art scientific and technical knowledge, so that this sector will be able to meet even the most challenging demands placed on it.

BZ: ZIM's reputation is due especially to robotics research.

Dr. Sorg: The first ZIM robot (ZIM 60-1) began operations in 1979 in the Max Refinery in Unterwellenborn. In 1980 we built 32 robots; in 1985 the number will be 496.

BZ: What features distinguish the first robot from its successors?

Dr. Sorg: Today's robots are lighter and more efficient. In 1984, we began production of the model ZIM 60-2. Because of its light construction, we were able to reduce the weight of the manipulator from 2100 to 890 kg and thus bring about improved dynamics and a faster working speed. In addition, the lifting capacity of the robot was increased from 60 to 75 kg. Manufacturing costs and the purchase price of the robot, which consists entirely of parts manufactured in the GDR, dropped to two-thirds. We intend to have completed the development of the ZIM 60-3 by the XIth Party Congress. This device will be even lighter and will be capable of working at a faster rate of speed.

BZ: What are the prospects for future developments in the field of robotics at ZIM?

Dr. Sorg: Before the end of this year we will have added a portal robot to this design series. It will have a lifting capacity of between 150 and 350 kg, and will therefore be able to handle transportation, handling and storage jobs more efficiently. The first ZIM portal is scheduled to begin operating on Metallurgist's Day this coming November.

The continued development of sensor technology is the focus of much concentrated research. We will intensify our research into the construction of complete, flexible production units. The focus is no longer on delivering a "naked" robot, but on providing turnkey facilities. In the Garden Construction Technology Combine, such a unit (robot and welding techniques) is being used at present for arc welding. Another task, which we will solve together with the Central Institute for Welding Technology by date of the XIth Party Congress, is the rationalization of complex welding processes at the VEB Flight Technology Facilities in Berlin. Work is also being carried out on the preparation of technological units for surface finishing, grinding and separating.

Users of ZIM robots no longer consist entirely of industrial plants in the area of Ore Mining, Metallurgy and Potash. Since January 1, 1985, we are the only manufacturer of electrically-powered jointed robots in the GDR. Our Applications Center on Romain-Rolland-Strasse in Pankow-Heinersdorf is ready to advise anyone who is planning to use robots. Very good use has been made of this service, by the way.

BZ: Are the robots stealing the limelight from other ZIM tasks?

Dr. Sorg: By no means. The field of robotics--which constitutes more than one-third of our total production--is more popular with the public, to be sure, but we are devoting just as much energy to our other concerns, for example to the custom-made equipment that we manufacture for the reconstruction and expansion of metallurgical plants. Microelectronic control technology, high-temperature-resistant thermal insulation materials and modern

combustion facilities make possible results of 20-25 percent in increasing efficiency and saving energy. Thus, by reconstructing the annealing facilities in the Ost Iron Mill Combine, we were able to create additional capacities for the new Ernst Thaelmann Converter Steel Plant, thereby saving investments that would have amounted to many millions of marks.

BZ: The Xth Plenum stressed that the combines which produce production facilities have a responsibility to offer a wide range of consumer goods. How has the ZIM responded to this challenge?

Dr. Sorg: At the present time, 22 consumer goods are produced in the plants of our combine. For example, the VEB Metallurgy Facilities in Wittstock manufactures collapsible balcony furniture and tourist chairs. One of the new products is an exercise unit for floor and apparatus gymnastics, which will be supplemented before the end of the year by horizontal and balancing bars. The VEB Metallurgical Electronics in Leipzig manufactures tachometers and voltmeters for cars, as well as electronic hobby kits. Our plant in Parchim is doing its part to increase the supply of hallway furniture.

The Metallurgical Furnace Construction plant in Meissen produces electrical kilns for hobby potters, which will soon be complemented by the addition of wheels for the painting and shaping of pottery. Handmade ceramics from our branch plant in Grieben, in the District of Potsdam, which have become well-known under the name of "Country Pottery from the Mark," enjoy great popularity. And the original plant in Berlin intends in the future to offer, in addition to lamps for exterior walls, a lamp set for the garden, consisting of pole lamp, hanging lamp and base illumination, as well as wrought-iron fencing sections and gates. We are preparing 250 symbolic, artistic wrought-iron guild signs especially for Berlin, as our small contribution to the beautification of the city.

BZ: We have heard that your combine has even further-reaching tasks in this regard.

Dr. Sorg: Yes, that's correct. We have been requested to create an office to oversee the production of consumer goods in the industrial sector Ore Mining, Metallurgy and Potash. This office will coordinate the development and production of products for the population. This also involves the necessary cooperation among the plants and combines. For the sake of continued progress, it is necessary to organize the manufacture of products from suppliers in the industrial sphere. We shall create facilities to expedite this process, for example, a Center for Molding and Tool Construction at the branch plant, a Center for Plastics Conversion in Parchim, and a Center for the Development of Microelectronic Switching Circuits for consumer goods at the VEB Metallurgical Electronics plant in Leipzig. All of this will help bring about a higher rate of productivity.

By the way, before the end of this year, our combine on Florastrasse in Pankow, near the S-Bahnhof, will open an industrial shop that will offer for sale all of the various consumer goods that we produce.

## Facts and Figures

The ZIM Combine encompasses five plants with a total of 3,350 employees. The five plants comprising the combine are: the head company, the VEB Automation Plant in Berlin with production facilities on Buchholzer Strasse in Niederschoenhausen; the VEB Light Metal Casting in Aue and the Wire Processing Plant in Grieben, as well as its subsidiary, the Metallurgical Assembly Plant in Velten; the VEB Metallurgical Furnace Construction in Meissen, with branches in Leipzig and Dommitzsch, the Metallurgical Facilities in Wittstock, the Metal Molding Plant in Parchim and the Metallurgical Electronics Plant in Leipzig. At the beginning of 1985, the Supervisory and Coordinating Center for Robotics at the VEB Progress Agricultural Machine Construction was added, so that the development and production of jointed robots is concentrated now at ZIM. The combine will attempt to renew 31 percent of production next year, 50 percent in the case of robotics and microelectronic products.

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5 November 1985

## GERMAN DEMOCRATIC REPUBLIC

## CALL TO IMPROVE SCIENTIFIC-INDUSTRIAL RESEARCH COOPERATION

East Berlin NEUES DEUTSCHLAND in German 30 Jul 85 p 2

[Unattributed article: "New Standards for Research Cooperation"]

[Excerpts] The Tenth SED CC Plenum has set new and higher standards for all sectors of our society, and in particular for the interaction of science and production, close cooperation between academies, universities and colleges on the one hand and combines, factories and facilities on the other.

We operate the economy--and, therefore, science and technology also--not as an end in itself. We are always profoundly concerned with the spirit of socialism, the increasing satisfaction of the growing material and intellectual-cultural needs of our people on the basis of the greatest possible rise in economic performance. That is the essence of the policy of the main task, the objective of our economic policy.

Because we are concerned with the prosperity of the people, we are resolved in future also to guarantee the greatest possible dynamism of our economic development. That is why we are pressing ahead with comprehensive intensification and consider the speed-up of scientific-technological advances, specially the best possible economic utilization of its results, the decisive source of the continuing rise in output. Just because we are mainly concerned with the happy, meaningful and peaceful life of our people, now and always, the party stresses the need to struggle for top standards in the decisive fields of science, technology and economics and to master all key technologies.

On the basis of our achievements to date and with a view to the continued pursuit of our policy of the main task in its unity of economic and social policy, the Tenth SED CC Plenum emphatically stated: It is not enough to simply continue with our hitherto successful approach. Cooperation in research must instead strive for new standards. In this connection Erich Honecker stressed that the stage of intensification upon which our country is now entering, requires "the far greater utilization of the advantages of socialism for coping with the scientific-technological revolution. Needed are significant innovations such as can be produced only by basic research geared to looking far into the future. This presumes new standards of research cooperation between combines, the facilities of the Academy, universities and colleges, oriented to economic aspects."



Obviously, the standards of intensification affect science itself. The process of research and teaching must be organized more efficiently and effectively.

The closer interaction and organic combination of science and production occurs primarily in the combines. By their establishment and development, our party has taken account of the fundamental laws of the process of the socialization of labor in the organization of the developed socialist society. Our combines now includes everything that belongs together in the circulation of intensively expanded reproduction.

The relations between combines and the Academy as well as the system of higher education will in future be much expanded. A considerable part of the scientific potential is going to serve basic research to provide the advances needed for our economic and social development in the 1990's. To put the necessary interrelations between basic research at the Academy and universities on the one hand and production on the other on a stable foundation, the Plenum called on the combines to plan money for promoting research at the Academy and universities by means of business contracts. Among the elements of such contracts will be industry's making available the most modern apparatus as well as exchanges of cadres.

Considering the future of science and technology, one of the most important benefits of socialism consists in the fact that the results of science and technology here do not need to fatten the profits of powerful corporations but instead serve the people. In 1871, Karl Marx wrote that only the working class would be able "to transform science from a tool of class rule to a strength of the people! Only in the republic of labor will science be able to play its proper role."

It is particularly obvious in our age that capitalism is unable to convert technical advances to social values. High technology in capitalism results in rationalization accompanied by the enormous exacerbation, eternalization and petrification of mass unemployment with all its asocial, anachronistic and inhumane consequences.

It is an important task involved in the education of cadres at our universities and colleges to make everybody conscious of such and other associations. In conjunction with the greatest possible technical capacity, the political and moral motivation of scientists, engineers, designers and technologists is of preeminent importance for the steadily more effective combination of the benefits of socialism with the achievements of the scientific-technological revolution. As Erich Honecker emphasized at the Tenth SED CC Plenum, the education of the people and the standard of management ultimately decide the success or failure of converting the most modern technology to the best economic result. He said: "Man and his abilities represent the main productive force, and we have to act accordingly."

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GERMAN DEMOCRATIC REPUBLIC

MAJOR AUTOMATIC CONTROL EQUIPMENT ENTERPRISE ASSESSED

Potsdam MAERKISCHE VOLKSSTIMME in German 31 Jul 85 p 3

[Article by Dr Klaus Hardenberg, engineer, party secretary, Teltow VEB "Wilhelm Pieck" Computer and Controller Works: "New Technology Also Places High Demands Upon Party Organization"]

[Text] Almost half of the BMSR [office machine and control] equipment produced annually in our republic comes from our factory. Thus we of Teltow bear large responsibility for the automation of many production processes within the national economy.

Starting with mass production of semiconductor transformers for measuring devices and the mass production of computer-supported "audatec" automation installations microelectronics has made its entrance into the activities of the VEB "Wilhelm Pieck" Computer and Controller Works in Teltow. Today "audatec" installations continue to prove their worth in the steel and rolling mill plant in Brandenburg and in the Schwedt Petrochemical Combine. They constitute the heart of switching and surveillance equipment in large industrial complexes.

There is increasing demand for our "audatec" installations and at the present time we cannot meet the demand existing domestically and abroad. This situation gives rise to what is the most important challenge confronting us, namely to accomplish a sevenfold increase by 1990 in the production of this equipment. Hence it is urgently necessary that we also guarantee in the coming years two-figure growth rates in labor productivity.

At the 10th congress of the Central Committee of our party the fact was emphasized that the battle to achieve a higher level of labor productivity is entering a new phase. We want our entrance into this new phase to be accompanied by the use of microelectronic computer technology and the creation of CAD/CAM methods.

BMSR installations must be specially adapted to specific applications. Thus there is a difference between a ship's air-conditioning system and the control system for processes taking place in a power plant. Hence in our plant the work preparatory to production, especially design and planning, has great importance. A high level of modernization (38 percent this year) and the ability

to cope with a growing production volume accompanied by frequent changes in customer desires necessitate the introduction of modern methods of planning and management, of production preparation, of scientific-technical work and also of production itself. In other words, BMSR installations involving microelectronics must today themselves be planned, designed, produced and tested with the aid of microelectronics. For us this all comes under the heading of CAD/CAM.

#### New Tasks for Political Work

There exist in our factory the basic prerequisites for the introduction and use of the new technology. We are in a position to build upon the great achievement orientation and high level of training possessed by our workers. Almost a third of all our employees possess a diploma from an advanced school or a technical school.

We also have at our disposal the requisite technical equipment or hardware. That is to say, a mainframe computer center, 6 office computers and 25 video monitors. The proper appreciation of the wide-ranging possibilities inherent in this new technology and its effective use places high demands upon our entire managerial activity. At the same time it confronts the party organization with entirely new problems.

Experience tells us that the introduction of such new technical methods first of all requires an intensification of political work. And in fact the final measure of the effectiveness of our political-ideological efforts as observed in the economic sphere is the extent to which those efforts help to create insight into objective necessities and form attitudes resulting in tangible achievements for our society.

The central task of our mass political work is to achieve recognition on the part of all workers of the fact that secure peace presupposes a strong socialism. And our efforts in this direction are further reinforced by the views of the 10th Central Committee congress. Lenin, as is well known, emphasized that the "productivity of labor in the last analysis is the most important and the decisive element in victory for the new social order." Thus initiatives aiming at increased productivity of labor are a matter of the most profound political importance.

#### Dealing With Attitudes of Reservation

Of course, there are still those who have reservations about the widespread introduction of the new computer technology. Inevitably there will be changes in the activities of engineers, especially in the case of designers and technologists and these changes will be revolutionary. The pencil and the notebook are being totally replaced by the video monitor, the computer and the EDP program. Customary modes of working are being replaced by entirely new methods.

"With one of those boxes"--meaning an office computer--"you have to be really exact and have respect for the machine," an experienced planner said to me.

But respect for and marveling at the new technology would be just as out-of-place as it would be to shirk those problems whose solutions are absolutely mandatory. Unproductive attitudes of this sort may also be found among us and we deal with them effectively. We ask and demand the involvement and vigorous forward movement of our comrades and of state supervisors so that old ways of working may be completely replaced by these much more productive new ones.

A computer is not a refrigerator, which you just have to switch on and which then goes to work. The computer has to be "fed" with software, with programs. The colleague working with a computer must be in a position to carry out a "conversation" with the computer. In other words, the introduction of CAD/CAM methods makes new demands upon the training level and it requires farseeing continued education.

The party leadership of the plant has set up the task of training, by year's end, 200 workers in the new computer technology in terms closely related to their work. And I find that it is important, especially in the case of functionaries, to lay the intellectual groundwork. We have placed stress upon this because they should certainly propagate the economic policy of our party intelligently and convincingly.

#### Substantial Effects Upon Planning

Preparations have been carried out over a long interval of time for the introduction of office computer technology and video-screen workplaces. Close contacts with the Jena Friedrich Schiller University, with the Bergmann Borsig VEB and other sources of experience in this domain have assisted us and are being expanded. And this has paid off in terms of economic effects: an office computer which has been in operation for 3 months in the planning section yielded a savings of material amounting to 134,000 marks and also saved labor time equivalent to the work of two planners.

In 1986 it is expected that the use of office computers and video-screen technology in planning will result in an 80-percent increase in labor productivity. This and the achievement of maximal economic effects through intense exploitation of technology is the subject of current plan discussions. At a standard utilization time of 10 hours our office computers are working on the average for 11 hours on each calendar day. In 1986, in the second year of their use, we aim to achieve 17 utilization hours per calendar day. We are creating the prerequisites for this in the course of plan discussion. At the same time it is necessary to create the social conditions called for and clarify the problems created by intensified shift work.

Computer technology is certainly not cheap, but it is our goal to amortize it in fewer than 2.5 years. We hope by 1986 with the aid of CAD/CAM methods to free the labor time of 80 employees in order to accomplish the required growth in performance. There exist concrete directives and guideline documentation provided by the party leadership for the entire project. At our plant's intensification conference in September we shall analyze what has been achieved up to that point and set up prospective goals for the next 5 years.

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GERMAN DEMOCRATIC REPUBLIC

# INTEGRATION OF OFFICE COMPUTER SYSTEMS, NETWORKING DISCUSSED

East Berlin RECHENTECHNIK-DATENVERARBEITUNG in German Vol 22, No 8, 1985 p 1

[Article by Prof Dr Wolfgang Schoppan, Berlin: "Management Tasks in the Development of Office Systems"]

[Text] In the present issue of this publication the reader will encounter some basic propositions regarding communications and office automation which relate particularly to the technology of computer networking. One must clearly understand in this context that responsibility for office organization and office systems is bound up managerially with responsibility for the use of automated information processing. The still current organizational threefold division into data processing, communications technology and office technology should also be integrated, in the interest of efficiency, under its managerial aspect and thus be included as much as possible in the planning tasks of business management. In conceptual planning the potential users must be included from the outset. Specialization of responsibility in terms of types of equipment or in terms of specific technologies will no longer pay. Such specialization could have been appropriate in planning the use of the EDP equipment of former times. But now overlapping technology planning and applications planning are important prerequisites for the successful construction of office systems. And who should be dealing with these problems? The integration of data processing, communications technology and office technology into a complex integrated office system requires a corresponding degree of coordination. In our present state of knowledge such coordination most properly should be practiced under the guidance of the directorates for organization and data processing in the combines and factories. The need for integration arises primarily out of the workplace structure in the office in the broadest sense. The majority of workplaces which exist in the office are so-called mixed workplaces which combine a multitude of functions. Therefore technological developments, too, are taking place in the direction of multifunctional workplace stations. Internationally well-known new telecommunications services will increasingly permit integrated approaches to speech, data and text communications.

In order to consistently carry through these basic ideas of integration and to effectively implement them one must achieve a system concept which guarantees, with regard to the multiplicity of devices and interfaces, compatibility of existing subsystems with developing subsystems. An essential managerial task

of this phase is the task of supplying competent and continuous consultation service in preparing for the use of these systems. The prerequisites for the successful use of office systems include primarily:

- i. adaptation to the strategic requirements of the various structural units at different levels of management on the basis of science and technology;
- ii. inclusion of the users in the development and introduction of the system concept;
- iii. education of the users with regard to use of the office systems.

Coordination of the considerations which we have listed will substantially reinforce the required long-term character of the integration concept. In preparing and carrying out such plans attention must be especially given to organizational realities and to the qualitative requirements which must be met by working cadres. The most important question confronting the decisionmaker is the extent to which the directorates of organization and data processing in the combines and factories are capable of handling problems of this type and of this breadth with regard to structural organization and the qualifications of working cadres. The necessary training measures must be promptly initiated. The fact must, of course, not be overlooked that the integration of data processing, communications technology and office technology with the object of creating office systems calls for a rather long development process. Office work may be looked upon as a specific form of human work having information for its subject matter. Also, work performed in the office in its broadest sense serves as preparation for decisions. In general a distinction may be made between routine office work and creative office work. Routine office work is performed on data channels without any reference on the part of the operator to the information contained therein, while creative office work is bound up with interpretation of the information content with a view to problem recognition or decision preparation and decision reaching. In order to be able to perform office work which is efficient in this connection office communication is an important prerequisite. There are a number of techniques of office communication which are quite conventional in practice, such as the use of the telephone, teletype, video-screen text, and the like, with each person having access to these types of communication service via his own terminal. With the increasing use of different services it is no longer efficient for these different terminals to exist separately side by side and therefore a so-called multifunctional terminal is desirable. In this connection it is also necessary for the development of future office systems that fixed standards of data communication and prescribed definitions, rules and structures must be kept in mind. But this becomes possible only to the extent that combine and factory managements clearly commission organization and data processing directorates to carry out the integration of data processing, communications technology and office technology. This mode of proceeding guarantees a comprehensive planning of office systems and finally an information infrastructure which is adequate to the needs of a combine.

GERMAN DEMOCRATIC REPUBLIC

CHAIRMAN OF NEW INFORMATION SCIENCES SOCIETY INTERVIEWED

Society's Founding Announced

East Berlin RECHENTECHNIK-DATENVERARBEITUNG in German Vol 22 No 8, 1985 p 2

[Unattributed article]

[Text] On July 1, 1985, founding ceremonies were held for the newly-established scientific "Society for Information Sciences of the GDR" (GIDDR). The GIDDR will become part of the GDR Academy of Sciences. Its voluntary membership will consist of specialists from the academies, the universities and other institutions of higher learning, industry, agriculture, and many other areas of society. The application of information sciences to all areas of social life requires a wide range of knowledge and ability in this field. The GIDDR intends to encourage scholarly debate and the organization of conferences, consultations and colloquia on key issues in this field of knowledge. The Society for Information Sciences of the GDR will have the following six special topic sections which correspond to the society's most urgent tasks and according to which its work will be organized: Theoretical Foundations, Computer Systems Designs and Operations Technology, Software, Information Systems Management, Artificial Intelligence, Education and Training, and Impact on Society.

On the occasion of the founding ceremonies, two scientific speeches were given, on "Communication in Complex Computer Systems" and "Computer Assisted Manufacturing and Planning," as well as talks profiling the work to be undertaken by the special sections. The executive board consists of well-known scientists from the Academy of Sciences of the GDR, the universities and other institutions of higher learning, and industry. The society's headquarters will be located at Clara-Zetkin-Str. 105, 1090 Berlin.

East Berlin RECHENTECHNIK-DATENVERARBEITUNG in German Vol 22 No 8, 1985 pp 5-6

/Interview with Prof Dr Dieter Hammer, Chairman, Society for Information Sciences of the GDR, by Franz Loll; date and place not specified/

[Text] Question: Why has the GIDDR been founded at this particular time?

Prof. Hammer: The Society for Information Sciences of the GDR came into being because at the present time, the application of information sciences is of enormous importance for all areas of society. The development of microelectronics made it possible to construct intelligent, information-processing structures which could be used in all fields. The chief objective is to use microelectronics to bring about new methods of rationalization. Information sciences represent a crucial factor in such questions as the efficient utilization of manpower, materials and energy. Information sciences impact upon the development of information and communication technologies. The processing and transferral of data is playing an increasingly crucial role in the more efficient organization of economic processes.

Question: To which objectives and tasks will the GIDDR devote itself?

Answer: Our work will focus on efforts to influence scientific activities in the area of information sciences--including educational activities in the schools and colleges.

And this influence touches upon the question of the way in which information sciences can be applied to all areas of society. The implementation of information and communications technologies requires that each individual come to terms with these questions. One of our objectives is to provide support for this process with the assistance of the appropriate specialists. Scholarly conferences represent a special focal area within the area of science. This area is in need of streamlining: conferences must be focused on a particular area of concern, and they should be run more efficiently. At present it can be observed that conferences on parallel issues are frequently held simultaneously. One of the concerns of the Society is that with the cooperation of its members, these conferences be reduced in number and limited in scope, and that this should be accompanied by a general improvement in quality. A third objective is to ensure very close cooperation between the Society and other organizations, e.g. with the Chamber of Technology [KDT], particularly with the WGMA of the KDT, or the Mathematical Society of the GDR so that our work can be clearly defined, research results can be compared, and common positions can be worked out. Finally, we would like to turn our attention to publication activities and to take a look at ways in which the work of publication could be streamlined. We would also like to be able to influence the content of published articles.

Question: What are the initial tasks confronting the GIDDR?

Answer: With respect to the structure of the Society, it will first be necessary to organize its scientific work into special topic sections, taking national economic priorities into consideration.



In the second place, there are at least eight different journals published in the GDR that are devoted to information sciences. In this regard, it appears to us advisable that efforts be undertaken to streamline and to differentiate clearly between the various journals; we intend to discuss these concerns with their editorial staffs.

A further problem area concerns the planning of the first events to be sponsored by the Society, as well as the planning and arrangements for an annual general meeting.

Question: Are there points at which the general meeting and INFO will overlap?

Answer: One of the Society's chief objectives is the continuance of INFO. We take for granted that this conference will continued to be held at the same intervals. The first steps in this regard will be undertaken later this year.

Question: How will membership in GIDDR be constituted?

Answer: Any citizen of the GDR who has graduated from a college or technical school and who is active in the field of information sciences can become a member of GIDDR.

Question: It would therefore be possible for a philosopher or an educator to become a member of GI if...

Answer: he intends to participate actively in the work of the society and if he is involved with issues that are of interest to the GIDDR. Such issues could include, for example, the impact of information sciences on society, a question which can not be dealt with by information scientists alone.

Question: How is the Society organized and how will it be structured?

Answer: There are regular, special and cooperative memberships. Regular members are those who have applied and been accepted for membership, based on the two prerequisites that I previously mentioned. Students, especially top students, are to be given the opportunity of joining the society as special members before they have completed their studies. Cooperative members are institutions and organizations that support the work of the Society. We would like to see many such institutions cooperate in our work by becoming cooperative members.

The Society itself consists of an executive board, a review commission, and the general assembly of members, which elects the first two committees.

Question: What comprises the executive board?

Answer: The executive board consists of respected scientists from the Academy of Sciences of the GDR, from higher education and from industry, who represent particular fields of knowledge. Heads of the special topic sections are represented, as are scientists who see to it that ties to other

organizations and societies are preserved. The research centers of several combines, which are directly involved in the practical application of the findings of information sciences, are also represented.

Question: How does one go about becoming a member and how can a member expect to benefit from membership?

Answer: In order to become a member, one must submit an application for membership to the Society. This application must be endorsed by two members of the Society. Membership becomes effective after the applicant has paid the annual dues of 25 marks. Special members pay dues of 10 marks. The most important obligation is the intention to actively support the work of the Society, and to contribute to the success of this work with one's individuality and with one's knowledge. Members will be given the opportunity of participating in conferences. Moreover, members will be informed about new trends in the field of information sciences. This will happen via the annual meeting and also by means of a newsletter. In this way we want to call to the attention of our members certain publications and events.

Question: How will the results of research undertaken by the Society be made known to the general public?

Answer: Basically, the Society will not directly process research findings; these tasks are carried out by the organizations to which they have been delegated.

The Society will be most effective in organizing conferences on timely and future-oriented topics, which will keynote highly-qualified scientists. In this way it will be of benefit to conference participants.

Question: How will the results of the work of the Society be implemented?

Answer: It will only be possible to implement the objectives toward which we are striving with the authority of the individual scientist. In this way, we want to push ahead with the application of information sciences in this country, so that this process is reflected more rapidly in an impact on the national economy.

Question: Thank you for talking with us, and we wish the GIDDR much success in its future work.

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GERMAN DEMOCRATIC REPUBLIC

BRIEFS

NEW SEMICONDUCTOR MEASURING TRANSDUCER--A Soviet laser welding machine is proving successful in the Teltow Instrumentation and Control Works in the production of a new semiconductor measuring transducer system. The new measuring transducers are equipped with microelectronic pressure sensors and have only a third of the weight of their predecessors. These devices, required in all areas of the national economy, measure the pressure of liquid and gaseous media and convert these measurements into electrical signals. They are needed in microcomputer-supported automated installations such as the "audatec" facility, also manufactured in the Teltow Instrumentation and Control Works, for the control and regulation of such complicated processes as those commonly found in the chemical industry or in nuclear power plants. [Text] [East Berlin BERLINER ZEITUNG in German 11-12 May 85 p 13] 8008

NEW CO<sub>2</sub> LASER SERIES--On the eve of the 40th anniversary of the liberation the MMM Combine of the Halle Plant of the VEB Precision Instrument Combine occupies a clear position of leadership in the competition to make proper preparation for the 11th Party Congress of the SED. Thus the number of exhibits has been increased to 180 percent as compared with the preceding year and space utilization has been increased to 111 percent. Outstanding objects among this year's exhibits are the new CO<sub>2</sub> laser SM 150, the electrohydraulic locking device for iron ingots and an automated testing device for printed circuits. These exhibits serve to promote the effective and wide-scale introduction of the most modern technologies in material processing and in technological rationalization with special emphasis upon increased production of consumer goods. At the same time, with the exhibit entitled "Conversion to CO<sub>2</sub> Laser SM 150," which in some respects embodies the most advanced features in the world, a unit has been created which is responsive both to the CEMA directive urging the development of high-efficiency technologies in machine construction and also to the program sponsoring cooperation with the Soviet Union up to the year 2000 in the development of laser technology. [Text] [Halle FREIHEIT in German 18 Apr 85 p 8] 8008

GEAR-GRINDING MACHINE PRODUCTION AUTOMATED--Berlin, BZ--Andre Mielke. All production collectives of the parent factory of the Berlin Machine Tool Combine (WMK) "7th October" have issued a decree on the occasion of World Peace Day to operate in peak production shifts. Thus these builders of machine tools aim at setting new records between 19 and 31 August and at subsequently repeating these records on a permanent basis. In three detailed consultations

with champion workers of the factory the main subject of discussion has been the creation of the most favorable conditions for peak performance shifts. One goal is the delivery ahead of schedule of tooth-flank grinding machines. It was already apparent in the initial discussions that a substantial reserve of performance may still be acquired in continuous cooperation between the various production areas. All suggestions circulating in these consultations are carefully considered. It is expected that they will be rapidly taken up in production preparations. Work in such preparation is intensified through the introduction of computer-supported manufacturing planning. Thus the 250,000 work cycles for the annual production of tooth-flank grinding machines are now being coordinated by the technologists through a data bank. This results in a great saving of labor time. Thus far it has already been possible to gain a saving of 22 workers for employment in other important tasks. Master workman Arno Swirtnia in the sheet metal department reported that his collective has already been able to establish new records in sheathing two grinding machines. On this basis and also on the basis of further experience to be gained from the peak performance shift his collective aims at working in accordance with 1986 parameters as early as the fourth quarter of this year. The large machinery and small machinery divisions as well as the transport division have also set themselves the same goal. The factory kitchen and canteen intend to support the production collectives in their fashion: through optimal service and a further reduction in waiting times. [Text] [East Berlin BERLINER ZEITUNG in German 6 Aug 85 p 1] 8008

GLASS, MATERIALS PROCESSING TRAINING--Scientific and technological problems of the Jena VEB Glass Works are being solved by students from the 11th and 12th grades of extended upper schools in the course of their scientific-practical work. The young people who come into the plant 1 day a week are familiarized with scientific areas by experienced counselors and gain a closer acquaintance with the structure of the manufacturing process. Thus in the past school year three groups of students have been busy in the Zeiss Combine Plant working with methods and technologies for precisely determining various parameters in the process of glass manufacture. At the same time the students are being held to exact research schedule dates within the departments. This responsibility stimulates them and encourages them toward significant scientific performance. The students have an opportunity to apply the knowledge which they have gained in instruction. In dealing with what are often difficult problems and with the opinions of colleagues they become aware of the fact that their intellectual potential has some weight and is of practical utility. Thus the upper school students in the 1984/85 school year have produced results having an economic value of about 16,000 marks. Besides the scientific-practical work of the extended upper school students the Jena Glass Works is also carrying out polytechnic instruction for 1,500 girls and boys of the general educational 10th grade upper schools. Here they acquire fundamental knowledge in the processing of materials and at the same time produce products in the course of the extensive production program; for example, connecting parts for large-scale engineering installations made of Jena glass. [Text] [East Berlin BERLINER ZEITUNG in German 6 Aug 85 p 6] 8008

ALLOY TESTING METHOD DEVELOPED--Soemmerda. Recently in the Soemmerda Office Machine Plant radioactive isotopes have been "testing" the quality of aluminum

alloys. Working jointly with the Freiberg Institute for Nonferrous Metals the office machine workers have developed a new type of machine with which the smelters in the aluminum foundry of the factory can directly check every batch at the work site. Expensive and time-consuming laboratory tests can thus be omitted and a uniform quality of the foundry products is guaranteed. In this process which the workers of Soemmerda have been the first in the GDR to employ in the light metal foundry for quality control, the alpha radiation of a radioactive isotope excites the aluminum to fluorescence. This fluorescent radiation in turn provides information with regard to the copper content of the alloys and thus tells how well the quality of the material meets standards. Since the new control procedure has been in use in the aluminum foundry of the Soemmerda Office Machine Plant, one of the largest in the GDR, the metal melts have been exclusively of a quality which makes reclamation unnecessary. [Text] [East Berlin NATIONAL ZEITUNG in German 17 Apr 85 p 6] 8008

PLASMA-CUTTING DEVICES FOR ROBOTS--Finsterwalde. The first series of plasma-cutting devices, combinable with the Model "ZIM 10-1" articulated robots, have been delivered by the workers of the Finsterwalde VEB Welding Technology Plant. Using the "PA 50" device developed jointly with the Dresden "Manfred von Ardenne" Research Institute power electronics and microelectronics as well as special sensor technology for surveillance of factory functions have been replacing traditional magnetic components. The 50-kw narrow-beam burner having a plasma core temperature of 20,000° Celsius produces a supernarrow incised seam while cutting metal up to 75 mm in thickness and thus yields a minimum of molten droppings. [Text] [Potsdam MAERKISCHE VOLKSZEITUNG in German 17 May 85 p 7] 8008

CIRCUIT LAYOUT EXPANDS MEMORY--The following is a description of a switching arrangement with which it is possible to store in direct communication with memory data quantities up to as much as 256 kbytes while achieving data rates in a range corresponding to the reciprocal of the access times of the memory components employed. By including a microcomputer in the memory configuration it is possible to achieve efficient operation in testing transmission units and data processing units. The semiconductor memory has been developed for testing digital transmission units and data processing units which are used in an information processing system involving optoelectronic sensors. Additionally, this memory configuration can be used with the help of a microcomputer to analyze quality parameters of the optoelectronic sensors. The need to use such a memory arose from the fact that the optoelectronic sensors employed, such as CCD lines or matrices, constitute a complicated optical, mechanical and electronic system which must be operated under well-defined measurement conditions and which yield an output signal which lies only within well-defined limits. This output signal is influenced, for example, by variations in the operating voltages, different operating temperatures, variations in brightness, noise in components and errors of quantification in the analog-to-digital converter. Thus there is a need to generate information which is specifically defined and reproducible for the test and which is characterized by the original data rate of the optoelectronic sensor which is to be simulated.

In the other application (in the analysis of quality parameters of the optoelectronic sensor) this memory configuration must store the data at the sensor's data rate and subsequently evaluate the data with the aid of the microcomputer. In order that during use of the memory configuration it should be possible to adapt to different sensors the maximum data quantity to be stored has been set at 262,144 individual image points, where each image point is quantified with 8 bits. The 256-kbyte memory has been constructed on eight printed circuits of 32 kbytes each with dynamic write-read memories (dRAM) of type K 565 PY 3. Control of the memory cards is handled by a microcomputer based upon the U 880 which was developed in the Institute for Cosmic Research. [Excerpts] [East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 34, No 4, 1985 p 243] 8008

SEMICONDUCTOR SENSOR TECHNOLOGY VIEWED--1. New Operating Principles and Technologies for Sensors. Modern measurement technology is no longer always able to meet quantitatively and qualitatively the increasing demands imposed upon it. Microelectronics has created a situation involving extensive and at times also relatively rapid information processing involving great demands on primary information. Opposed to this there are the inadequacies of an "antediluvian" method of information acquisition. The bottleneck does not primarily lie in the area of information preparation but rather in the domain of the sensors. Without going into terminological questions we shall here understand "sensors" to mean measurement pickups which yield microelectronically compatible imaging signals produced by mainly nonelectrical measurements. At the present time one repeatedly observes attempts to "evaluate" inadequate primary information through extensive processing algorithms with the aim of reaching conclusions which range beyond what was actually contained in the original information. Since this can be distinctly dangerous an effort must be made to sharply raise the level of information acquisition. In the last analysis this is simply a matter of making sure that there is a supply of more and better sensors. This quantitative and qualitative expansion of the available supply cannot be accomplished simply by improving existing sensors. We must also engage in entirely new approaches. These new approaches would include on the one hand the investigation and utilization of new operating principles and on the other hand the development of new manufacturing technologies which, in particular, would make it possible to produce large-batch quantities at low prices. A significant advance in this connection has been the employment of typical semiconductor technologies in the manufacture of sensors. This is particularly important because in the same manufacturing process it is possible to produce not only the actual sensor but in addition electronic circuitry for forming and preprocessing the measurement signal. This entails advantages with regard to metrological features, miniaturization, reliability and not least of all also with regard to cost. The piezo-resistive pressure sensors are a well-known example of this. Despite the great importance of semiconductor sensors manufactured principally on a silicon base, at the same time a whole series of other manufacturing technologies for sensors have been created which promise specific advantages for particular applications (e.g., in analyses and in humidity metrology). Without making any claim to completeness one might mention here (i) the technologies of thin and thick laminae, (ii) the technologies of thin films, (iii) ceramic and sintering technologies, as well as (iv) glass fiber technologies. Of the products issuing from these



technologies those sensors which are compatible with light-wave conductors, in particular optical fiber sensors, exhibit some peculiarities which are briefly discussed in the following. [Excerpts] [East Berlin ELEKTRIE in German Vol 39, No 4, 1985 p 134] 8008

MICROCOMPUTER-CONTROLLED TELEPRINTER--As a result of the rapid development of technology the duration of successive generations of precision instrument products and electronic products has substantially diminished in recent decades. Although teletype terminals are an infrastructure pillar which may be classified in the "long-lived" category, they are also subject to this general tendency. This is especially apparent in the extensive shift of functional principles from mechanics to electronics which has taken place and in the substantial expansion in functional scope, in automation and in control intelligence resulting from the use of microcomputer technology. Consistently with this trend the microprocessor-controlled teleprinter F 2000 has been designed and developed in the Zwoenitz VEB Measuring Instrument Plant. In addition to economic and market-oriented requirements, the following engineering considerations form the basis of the design: (i) inclusion of convenient user-oriented electronic memories for text processing; (ii) creation of an excellent print image with flexible variant-specific font shapes; (iii) flexible variant-specific interfacing technique for all important types of modulation occurring in telegraphic transmission, design-integrated into the instrument; (iv) operating comfort; (v) "upwardly open" design, i.e., expandability for extended external peripherals and additional use for data transmission in 7-bit code and with transmission speeds as high as 300 baud. [Excerpts] [East Berlin NACHRICHTENTECHNIK-ELEKTRONIK in German Vol 35, No 3, 1985 p 93] 8008

NEW PROCESS CONTROLLER DEVELOPED--The level of performance which has been reached in the area of microelectronics both in connection with switching circuits and also in connection with the technology of design and programming has made possible in the field of automation modern engineering approaches in equipment having a high degree of utility. In an analysis of international developments the following trends are discernible: (i) in equipment engineering the dominating theme in the direction of flexible adaptation to the most varied applications has been more and more a recognition of the power of software and the technologies which serve its application; (ii) the design of a program which describes the task of a specific user is carried out through the use of efficient software components which are attuned to one another in terms of their effects. The individual steps in this process are to be interpreted as elements in CAD software technologies which are bound up at the same time with a high level of increased efficiency on the part of the user; (iii) the equipment technology is for the most part being offered by the manufacturer in the form of functional complexes in modular construction. There is a corresponding further advance in the degree of functional decentralization and there is opened up the possibility of using microprocessors and single-chip microcomputers in individual module form to yield a complex solution; (iv) in design increasing importance is accruing to so-called "compact designs" (mechanically housed electrical modules which can be linked in appropriate styles of assembly). These engineering approaches permit, in particular in the area

of small-scale and medium-scale automation, easily designed and easily integrated approaches; (v) these devices, often also called "basic stations," are assigned, in terms of information processing, to limited regulatory and control task complexes. The possibility of coupling to serial interface channels also permits locally decentralized operation as well as autonomous use. As a consequence of the trends which have been mentioned and of the need of the GDR national economy for efficient automation technology there is being developed at the present time a device called the process controller R 5010 (PC R 5010). This is a product of the Center for Research and Technology of the Berlin-Treptow "Friedrich Ebert" VEB Combine Electroapparatus Plants (KEAW). This consists of a pilot device in compact construction and the basic controller device (constructed in the form of housed modules in accordance with the compact controls design philosophy) as a component of EAW electronics. At the same time in close cooperation the Dresden Technical University, Section 9, Area 3, dealing with regulation technology and process control, is developing the CAD software components for the user program technology, the analysis of the controlled system, the synthesis of the control cycle, the off-line simulation and off-line testing as well as on-line coupling required to put the system into operation. It is the aim of this paper and also of the papers [1] and [5] to familiarize the interested reader with the system philosophy of the PC R 5010 in terms of its hardware and software as well as with the CAD technologies of user program development, with control cycle synthesis and with the simulation and testing of user programs. [Excerpts] [East Berlin MESSEN STEUERN REGELN in German Vol 28, No 6, 1985 p 6] 8008

LASER USE IN CIRCUIT PRODUCTION--A technology for separating oxide-ceramic substrate material for a group of microelectronic hybrid switching circuits has been developed in the Hermsdorf Ceramic Works Combine. The heart of the equipment is a laser device produced by the Halle Precision Instrument Works Combine. The ceramic panels, manufactured with dimensions of 65 mm x 105 mm and but little more than 0.5 mm in thickness, can be subdivided into smaller sections using the new technology. They then correspond to the various dimensions of recent switching circuits. The plates, under computer control, are moved beneath the laser beam and the latter produces on the surface of the plate as many as 1,000 very fine fused sites per second. The thus-prepared substrate material can then be easily broken along the length of these traces and thus divided with high precision into segments having the desired dimensions. Since even before this operation the user can print the conducting halves and the resistance laminas for numerous switching circuits simultaneously there results a substantial increase in productivity as compared with the application of these strata to tiny individual panels. [Text] [East Berlin FEINGERAETETECHNIK in German Vol 34, No 3, 1985 p 110] 8008

ELECTRONIC SWITCHING SYSTEM IMPROVED--In those networks which exist in fringe areas there is the possibility of using the OZ 100 D local exchange in remote and unmanned operation as a suboffice in place of line concentrators. This mode of operation is economically especially advantageous because through the direct connection between the communication lines and the group dialing stages of the terminal exchange office there is a saving of substation transformers and subscriber switchboards. The possible existence of internal traffic, which is permitted by use of the OZ 100 D as a central exchange results



additionally in an unburdening of communications lines. With the OZ 100 D the telephone traffic of 96 subscribers can be concentrated in 24 analog or 30 digital channels. In opening up areas requiring the services of communications engineering the use of the OZ 100 D in cooperation with the digital radio-relay facility PCM 10-400/800 of the Radeberg VEB Roboton Electronics Plant as a transmission device is especially useful. Assuming quasi-optical visibility the radio link has a range up to 50 km without an intervening relay. With two digital 704-kbit/sec interfaces the OZ 100 D presents the possibility of connecting one or two PCM-10 systems. Thus it is possible to obtain the following variants: (i) use of a PCM-10 system as a superior exchange to achieve lower traffic values (0.04 connection [?]/subscriber); (ii) use of two PCM-10 systems operating in directions parallel to the superior exchange (0.11 connection/subscriber); (iii) use of two PCM-10 systems in two directions with connection to two different exchanges; (iv) linking of two OZ 100 D's via one PCM-10 route; in addition, linkage of each of two OZ 100 D's with the superior exchange via one PCM-10 route. [Text] [East Berlin NACHRICHTENTECHNIK-ELEKTRONIK in German Vol 35, No 3, 1985 p 87] 8008

ELECTRON-BEAM WELDING IN USE--For the first time electron-beam welding is being employed as a manufacturing process in the construction of machine tools, in the parent factory of the Fritz Heckert Combine. By combining electron-beam welding with a robot which operates in a vacuum as a workpiece changer increases up to as much as 1,000 percent in labor productivity are being achieved. At the same time the process yields material savings up to 30 percent and there is also an improvement in quality because the welding is associated with less warping. While in the past three welded parts were processed in a 25-minute cycle time now with the new technology 55 welded parts are possible in a 55-minute cycle time. This complex is supplemented by the use of a flexible-process robot which recognizes those parts which have been completely welded and stored in the parts magazine. The robot then extracts these parts, brings them to a preservation treatment station and deposits them upon conventional pallets in accordance with a specific warehousing program. [Text] [Leipzig URANIA in German Vol 61, No 5, 1985 p 70] 8008

REAL-TIME OPERATING SYSTEM--The real-time operating system KOMI provides the user with a broad spectrum of system services which can be activated through subprogram calls. As a rule the required parameters are input into registers. At first KOMI was developed for individual computer systems. In order to meet new requirements by using multimicrocomputer systems there has been developed on the basis of KOMI the distributed real-time operating system KOMINET. It is described in this article. KOMINET is a real-time operating system which supports both the coordination of parallel computer processes on individual computers and also communication between computing processes on different computers. It is suitable for the creation of simple microcomputer combination systems in process automation and laboratory automation. As a result of the modular structure of the system and the readiness with which it gives rise to further generation KOMINET is easily expandable and adaptable. The system's possibilities also make it interesting for robotic applications. [Excerpts] [East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 34, No 7, 1985 pp 455-456, 462] 8008